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Migration and the Skill Composition of the Labor Force

The Impact of Trade Liberalization in Developing Countries

The average skill level of the labor force in a developing country tends to improve under a policy of trade liberalization and to decline under increased protection.

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Summary findings

In the standard Heckscher-Ohlin model, trade and migration are substitutes (that is, migration decreases with trade liberalization). López and Schiff add four factors to the standard Heckscher-Ohlin model: labor skill levels (skilled or unskilled), international labor mobility, migration costs, and financing constraints.

They examine two types of simulation. Case 1 applies to countries in the post-demographic transition stage, with a stable population. This includes countries of Eastern Europe and the former Soviet Union.

Case 2 applies to countries with rapidly growing populations, such as Egypt, El Salvador, Mexico, and Morocco.

In case 1 (Eastern Europe and the former Soviet Union), trade liberalization raises emigration of the unskilled (and has no effect on emigration of the skilled), while greater protection raises emigration of the skilled (and has no effect on emigration of the unskilled). That is, any change in trade policy raises total emigration, but trade liberalization improves the average skill level of the labor force and increased protection lowers it.

In case 2 (developing countries with rapidly growing populations), trade liberalization raises emigration of the unskilled and reduces emigration of the skilled. That is, the average skill level rises and the net effect on total emigration is ambiguous. The opposite occurs with increased protection.

In both cases, the average skill level of the population falls when protection increases in the presence of international migration, high migration costs, and financing constraints. Under the same circumstances, the skill level rises under trade liberalization.

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1. Introduction

The question of whether trade and migration are complements or substitutes has been the focus of much research and has become a major topic in the policy debate in a number of OECD countries. The issue has been discussed prominently in North America in the context of the integration of Mexico into NAFTA. The same has occurred in Western Europe, where trade liberalization with Northern Africa and Eastern Europe has been seen as a way of reducing migration.[1]

Policymakers in the European Union (EU) have become increasingly concerned with this issue due to a perceived diminished capacity to absorb immigrants and due to the fear of a large increase in immigration in the future. In other words, demand for immigrant labor has fallen while the supply is expected to increase. Similarly, the Mexican crisis of December 1994 and the subsequent austerity program has led to fears of a significant increase in migration to the U.S. In fact, it has been reported that the flow of immigrants from Mexico to the U.S. was twice as large in January 1995 than in January 1994.

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[1] The studies which have examined the effects of regional integration have abstracted from the effect on migration. A number of interesting papers on regional integration in the major trading areas are presented in Anderson and Blackhurst (1993), including the history, political economy, and legal and institutional aspects of regional integration. On studies of European integration, see Winters (1992). On the expansion of the EU and on association agreements, see Winters (1993).

Among other instruments, policy-makers have considered using trade policy in order to deal with the perceived immigration "threat". For instance, in the context of the concern with massive emigration from the former Soviet Union (FSU), Germany's foreign minister Kinkel recently declared that opening West European markets to goods from the east should be a priority in a new initiative on a common European "ostpolitik" (Financial Times, March 24, 1994). And in the context of NAFTA, former President Salinas of Mexico stated: "Mexico wants to export more goods, not people." Other proponents of NAFTA, including Vice President Gore, have also argued that NAFTA will help reduce the migration pressure from Mexico. This assumes that liberalizing trade results in lower migration.

The traditional trade literature based on the Heckscher-Ohlin model claims that trade liberalization leads to a fall in international migration by reducing international factor price differences. And since trade liberalization results in more trade, the implication is that trade and migration are substitutes.[2] However, the assumptions made in this literature do not necessarily reflect the actual conditions under which migration between developing and developed countries takes place.

Other trade theoretic papers (Markusen 1983, Wong 1983) have argued that trade and migration may in fact be complements. Markusen argues that substitution is a special case based on factor proportion models. He claims that if the basis for trade is other than a difference in relative factor endowments — such as a difference in technology or economies of scale — then trade and migration are complements. Economies of scale, combined with preference for diversity, result in intra-industry trade and can explain an important share of North-North trade. It is less relevant for North-South trade. Technological differences are more important in

[2]The seminal paper which derives the substitutability result is Mundell (1957).

explaining North-South trade. However, Markusen's complementarity result in that case is due to the assumption that technology is higher in one country but only in one sector. Alternatively, one might realistically assume that the higher technology is embedded in one factor (say, capital) which is more productive in both sectors in the more advanced economy (say, with better machinery in both the agricultural and industrial sectors). If the cross-country difference in the technology of capital is the same in both sectors, we obtain the standard result that migration and trade are substitutes.

The migration literature claims that trade and migration are complements in the short and medium run though not in the long run, so that liberalizing trade will raise migration for a period which may last ten or even twenty years (U.S. Commission for the Study of International Migration 1990, Russell and Teitelbaum 1992, Martin 1993). Though the ideas presented in that literature may have a lot of merit, no rigorous framework is presented.

Previous studies based on the Heckscher-Ohlin model conclude that trade and migration are substitutes. Our analysis expands on the standard Heckscher-Ohlin model by adding some features which are characteristic of developing countries, and which result in substitution between trade and migration in some cases and complementarity in others.

The purpose of this paper is to shed some light on the conditions under which trade liberalization in the developing countries is likely to cause an increase or a decrease in out-migration. The paper also examines the impact of trade liberalization on the skill composition of migration and of the labor force. For this purpose, we explicitly incorporate four additional features in the Heckscher-Ohlin model: heterogeneity of labor skills, international migration, migration costs and constraints on financing migration.

The remainder of the paper is organized as follows: In Section 2, supporting evidence on migration costs and financing constraints is presented. Section 3 discusses some basic assumptions. Section 4 sets forth the basic model and Section 5 derives the comparative static results. Section 6 provides some extensions and Section 7 concludes.

2. Evidence on Migration Costs and Financing Constraints

Starting with financing constraints, many potential migrants in developing countries have little or no collateral and cannot obtain the necessary credit to finance their migration costs. As they are unable to borrow money based on their higher expected future earnings - especially since these earnings are expected to materialize in another country - workers who want to emigrate must for the most part rely on their own savings to finance their migration costs.[3]

Second, migration costs may account for a large share of the income of potential migrants from developing countries. The empirical evidence regarding these costs is limited but two recent studies by Richard Adams (1991, 1994) report high migration costs to the Gulf for potential emigrants from Pakistan and Egypt. The average cost of migration for an emigrant from rural Pakistan to Saudi Arabia or Kuwait, for example, was Rs 21,000 or U.S. $1,300 at the time a survey of 727 households was performed (1986-89). Data indicate that this cost constituted an effective constraint to migration for potential migrants in the poorer households.

Similar findings are obtained in the case of Egypt. A survey of 1,000 households in rural Egypt performed in 1986 revealed that the average cost of migrating to Irak was US $365. If one includes the subsistence cost required for the two-month period that was necessary on

[3] They might have access to credit in the informal market at prohibitive rates, but the net present value of the migration project would be negative in those cases.

average to find a job in Iraq, the full migration cost is closer to U.S. $500. Because of the cost of obtaining a number of expensive permits, the migration cost to Saudi Arabia was about U.S. $1,000 or twice the cost of migrating to Irak. These figures are extremely high considering that the average monthly wage for the people surveyed was only U.S. $65. Thus, the migration cost to Saudi Arabia (Irak) was equivalent to a fifteen (eight) month salary for these (potential) emigrants, a sum which is not easy to accumulate out of own savings.

What is the combined effect of migration costs and credit constraints? Some evidence is available from Reed (1994) who examines migration behavior from the Northeast of Brazil, the country's poorest region, to Sao Paulo in the South. She finds that adverse economic shocks in the Northeast deter migration while family wealth promotes it. Reed concludes that migration from the Northeast of Brazil is limited by credit constraints. She also finds that the negative impact of credit constraints is weaker in the case of individuals with more years of schooling. This paper attempts to explain some of these findings by formulating a migration model which incorporates migration costs, credit constraints and skill heterogeneity.

3. Some Basic Assumptions

In the presence of migration costs and financing constraints, a richer analysis is obtained by allowing for both skilled and unskilled labor. We assume that both types of workers are identical except that the skilled workers are more productive. Both types of workers live two periods. They work in their home country in the first period, earn some income, and must then decide whether or not to use some of that income to migrate.

Migration is assumed to take place from a small labor-abundant economy in the South to a capital-abundant economy in the North with the same technology. The South initially

protects its capital-intensive activities (Krueger 1978; Bhagwati 1978) and the North imposes restrictions on imports from the South. The latter results in lower export prices for the South. Both protection in the South and in the North result in a lower wage rate in the South than in the North. [4]

Trade liberalization under these assumptions can be characterized by a reduction in the tariff rate imposed by the South, by an increase in the export prices faced by the South due to a relaxation of the North's restrictions on imports from the South (as in a preferential agreement), or both. Given the usual symmetry and homogeneity conditions, it is clear that the effects on factor prices in the South of a reduction in (tariff) protection or of an increase in the export price are qualitatively the same. Both will cause a rise in the wage rate and a reduction in the rental price of capital if the South protects its capital-intensive activities and export labor-intensive goods. In this paper we choose to focus the analysis on a reduction of protection in the South. In fact, a number of developing countries which are a significant source of migration flows to the North - such as Mexico and Morocco - have liberalized their trade regime unilaterally. Consequently, the analysis focuses on the effects of unilateral trade liberalization in the South.

[4]In reality, wage differences between North and South are caused by other factors as well. These include differences in the level of technology and in the level of human capital. We generate a lower wage in the South (and thus an incentive to migrate) through protection of imports because we are interested in the impact of changes in trade policy on the level and composition of migration flows. Adding a difference in technology or human capital between North and South has no qualitative effect on our results (but see the extensions in Section 6).

4. The Model

We start from a Heckscher-Ohlin model and add four features which reflect conditions found in many developing countries: skill heterogeneity, international labor mobility, migration costs and financing constraints.[5] Consider a small open economy in the South which produces two goods under a constant returns technology using capital and labor. Capital and labor are assumed to be mobile across the two sectors. There are two categories of labor, skilled and unskilled, which differ in their productivity by a factor γ ($\gamma > 1$). That is, skilled workers are γ times more efficient than unskilled workers, but otherwise both labor inputs are identical. Thus, the production functions of each sector can be represented as follows:

$$(1) \qquad y_i = F^i (L_i^u + \gamma L_i^s, K_i); \qquad i = 1, 2,$$

where y_i is output of industry i, L_i^u and L_i^s are the levels of unskilled and skilled workers used in industry i, respectively, and K_i is the level of capital in industry i.

Since the relative labor efficiency is the same in both sectors (i.e., γ is identical for the two industries), and since labor is fully mobile across sectors, it follows that the real wage rate for skilled workers is γ times the real wage for unskilled workers, or

$$(2) \qquad w_s = \gamma w,$$

where w_s is the real wage of skilled workers and w is the real wage of unskilled workers.

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[5]For an exposition of the Heckscher-Ohlin model, see Dixit and Norman (1980) and Woodland (1982).

Given equation (2), the minimum average cost functions for each industry can be written as functions of either w_s or w. We choose to express them in terms of w. Normalizing the world prices to unity, competitive long-run equilibrium with diversified production implies

$$(3) \quad \text{(i)} \qquad c^1(\tilde{w}, r) = 1 + \tau,$$

$$\text{(ii)} \qquad c^2(\tilde{w}, r) = 1,$$

where $c^i(\cdot)$ (i = 1, 2) are the minimum average costs in each industry, r is the (nominal) rental price of capital, $\tilde{w}$ is the nominal wage for unskilled workers, and τ is the rate of tariff protection to the capital-intensive industry 1. Equations (3) solve for $\tilde{w}$ and r, and substituting the value of $\tilde{w}$ obtained from equation (3) into equation (2), we obtain the nominal wage rate for the skilled worker, $\tilde{w}_s$.

We assume that migration is costly and that the cost of migration differs across individuals according to their location and their migration-specific skills. International migration costs are lower for people living close to the border with the destination country rather than in remote locations, for those who are better at searching for jobs in the destination country, for those who are better informed about the market for illegal migration services, and generally for those living in cities rather than in rural areas.[6]

Real migration costs for skilled workers are also likely to be lower than those for unskilled workers. There are at least two reasons for that. First, one would expect the skills of the skilled workers to also apply to the ability to acquire information about job opportunities

[6]It should be noted that the relevant migration costs from the viewpoint of financing constraints include not only transportation costs and fees for intermediaries but also the subsistence cost while searching for a job in the destination country.

in the destination country, about best migration routes, and [illegible] legal aspects related to residence and work in the destination country. Second, a larger proportion of unskilled workers migrates illegally. This is the case, for instance, with Mexican immigration to the U.S. And illegal immigration is generally more expensive than legal immigration because of the payments illegal migrants need to make to the intermediaries who provide illegal migration services (the so-called "coyotes" on the Mexico-U.S. border), and because a share of illegal migrants gets caught and must make more than one attempt before succeeding. Thus, we assume different migration cost functions for the skilled and unskilled workers:

$$
\begin{aligned}
(4) \quad (i) \quad & g = g(L_u - M_u); \qquad g' < 0,\ g(0) = \bar{g}, \\
(ii) \quad & h = h(L_s - M_s); \qquad h' < 0,\ h(0) = \bar{h}, \\
& \text{and } g(x) \geq h(x) \text{ for any } x \geq 0,
\end{aligned}
$$

where $g(\cdot)(h(\cdot))$ is the migration cost of unskilled (skilled) workers, L_u (L_s) is the initial endowment of unskilled (skilled) workers, and M_u (M_s) is the total amount of unskilled (skilled) workers who migrate. The fact that $g'(\cdot)$ and $h'(\cdot)$ are both negative implies that migration costs increase with the level of migration, and that, ceteris paribus, workers for whom migration costs are the lowest migrate first. In equation (4), $\bar{g}$ and $\bar{h}$ are the costs for the workers with the highest migration costs and who are the last to migrate.

We assume that workers do not have access to credit to finance their migration costs and that their wage is their only source of income.[7] Workers are assumed to live two periods.

[7]As is the case in many developing countries, capital is assumed to be concentrated in the hands of a few capitalists. Their entire income comes from capital so that they have no incentive to migrate. And since migration is costly, they remain in the South.

They get paid and consume at the end of each period. Their decision is whether or not to migrate at the end of the first period. Output is assumed to be perishable, so that consumption — plus migration costs if they decide to migrate — equals income in each period. Also, workers need a minimum level of income in order to subsist. Thus, a worker is able to migrate at the end of the first period if his/her wage in that period is greater than or equal to the sum of the subsistence wage and the migration costs. Of course, this is only a necessary condition for migrating and not a sufficient one.

Unskilled worker j maximizes the present value V^j of his/her utility flow

$$V^j = U(C_1^j) + \delta U(C_2^j), \tag{5}$$

where δ is an intertemporal discount factor and C_i^j is the aggregate consumption level in period i. The budget constraint if he/she does not migrate and does not, therefore, save is $E(p_1, U_1^j) = \tilde{w}^1$ and $E(p_2, U_2^j) = \tilde{w}^2$, where $E(\cdot)$ is the expenditure function, p_k ($k = 1, 2$) is a vector of goods prices in each period, and $\tilde{w}^1$ and $\tilde{w}^2$ are the nominal unskilled wages in period one and two, respectively.

If preferences are homothetic, then we can write $E^1 = U_1^j e(p_1)$ and $E^2 = U_2^j e(p_2)$, where $e(\cdot)$ is a cost-of-living index and U_i^j is utility in period i. In this case, $U_1^j = \frac{\tilde{w}^1}{e(p_1)} \equiv w^1$, $U_2^j = \frac{\tilde{w}^2}{e(p_2)} \equiv w^2$, where w^1 and w^2 are the real wages. If preferences are Cobb-Douglas, then the cost-of-living index is also Cobb-Douglas and, hence, given that world prices are normalized to one, $e(\cdot) = (1 + \tau)^\alpha$, where α is the share of good 1 in consumption. Hence the real wage is simply equal to the nominal wage divided by $(1 + \tau)^\alpha$.

Workers expect policies to remain unchanged over time and any policy change is assumed to be permanent. Unskilled workers earn $w^1 = w$ in the home country (South) in period 1. If unskilled worker j remains in the South in period 2, he/she will earn $w^2 = w$ in period 2 as well. Then the utility level of worker j if he/she does not migrate is $V_A{}^j = w + \delta w$. If the unskilled worker j migrates, he/she must first invest a migration cost g^j (for the unskilled) at the end of period 1 in order to earn the higher wage w^* at the end of period 2. Then utility is $V_B{}^j = (w - g^j) + \delta w^*$. Potential migrants compare $V_A{}^j$ and $V_B{}^j$ and select the larger of the two. This is of course subject to the financing constraint that w be greater or equal to the sum of the subsistence cost and the cost of migration. If w is smaller, then $V_A{}^j$ is the only choice.

The condition $V_A{}^j > V_B{}^j$ is equivalent to the condition $w^* - w > \frac{1}{\delta} g^j$. For simplicity, we abstract from the discount factor δ. Then, the condition $V_A{}^j > V_B{}^j$ is equivalent to the condition that $w^* - w > g^j$, or to the condition that the wage difference be larger than the migration cost. These simplifying assumptions have no qualitative effect on our results. [8] Thus, the unskilled worker j is assumed to migrate if

(6) (i) $w - \bar{w} \geq g^j$, and

(ii) $w^* - w \geq g^j$,

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[8] Of course, if δ_j differed across workers, then this would be another reason why workers would have different effective migration costs, where effective migration costs are defined as $\frac{1}{\delta_j} g^j$. In fact, as long as the discount rate δ_j is constant for each worker and does not vary with his/her wage, we can redefine the cost of migration as $G^j = g^j/\delta_j$ and proceed with G^j rather than with g^j. This would not affect the ensuing analysis.

where $\bar{w}$ is the subsistence wage, w^* is the unskilled wage rate abroad and g^j is the migration cost relevant to unskilled worker j.[9] The same condition (6) holds for the skilled workers, where the unskilled wages are replaced by the skilled wages and the migration cost g is replaced by h.

We first assume that the binding constraint to the migration of skilled workers is the incentive to migrate while the binding constraint to the migration of unskilled workers is the financing constraint. These assumptions seem to be supported by some of the available (and limited) evidence and were selected because they enable us to show in a clear way the differential impact that changes in trade policy have on the migration of skilled and unskilled labor. In Section 4, we also examine the effects of trade liberalization in the more general case where these assumptions are relaxed.

Thus, the wage for skilled workers is assumed to be sufficiently above $\bar{w}$ to cover the maximum migration cost possible among the skilled workers, i.e., $w_S - \bar{w} > \bar{h}$. That is, the migration cost is assumed not to be a binding constraint even for the skilled worker with the highest cost of migration. Thus, the total migration of skilled workers will be determined by

$$\gamma(w^* - w) = h(L_S - M_S). \tag{7}$$

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[9] Condition (6)(ii) holds under the assumption that w and w^* will remain unchanged in the future. If potential migrants believe that w or w^* may change over time, then there are two reasons why condition (6)(ii) may not hold. First, if potential migrants are risk averse, they will also be concerned with the distribution of w and w^* and, ceteris paribus, will prefer the one with the lower variance. Second, even under risk neutrality, condition (6)(ii) may not hold because migration involves an element of irreversibility or hysteresis. Once the person has migrated, if the return on migration falls (say, because w increased unexpectedly), the person cannot undo the migration choice in a costless way because of the exit cost (migration costs must be paid to return to the home country). These considerations lead migrants to demand a higher rate of return on migration in order to cover (insure) against these potential losses. On hysteresis, see Dixit (1989) and Pindyck (1988).

We assume that $\gamma(w^* - w) < \bar{h}$, because otherwise all skilled workers would migrate.

For the unskilled workers we assume that constraint (6)-(ii) is not binding. That is, the gap between foreign wages and domestic wages is greater than the migration cost of the workers with the highest migration cost, or $w^* - w > \bar{g}$. By contrast, constraint (6)-(i) is binding for at least some workers. Thus, migration of the unskilled workers is determined by

$$w - \bar{w} = g(L_u - M_u). \tag{8}$$

Given w and $\bar{w}$, only a subset of the unskilled workers is able to pay the migration costs. This subset migrates. Figure 1 shows the situation where $w^* - w > \bar{g}$ and $w - \bar{w} < \bar{g}$. All the unskilled workers would like to migrate since their income gain $w^* - w$ is larger than the migration cost $\bar{g}$ of the least efficient potential migrant. However, not all are able to pay for the cost of migration. Out of the initial total population of unskilled workers, OL_u, only OM_u workers are able to finance their migration costs from their income net of the subsistence wage. This means that at the start of the second period, OM_u unskilled workers have emigrated and the total effective endowment of unskilled labor is $L_u - M_u$.

Figure 2 shows the migration equilibrium for skilled workers, with OM_s workers emigrating at the end of period 1 and the endowment of skilled workers at the start of period

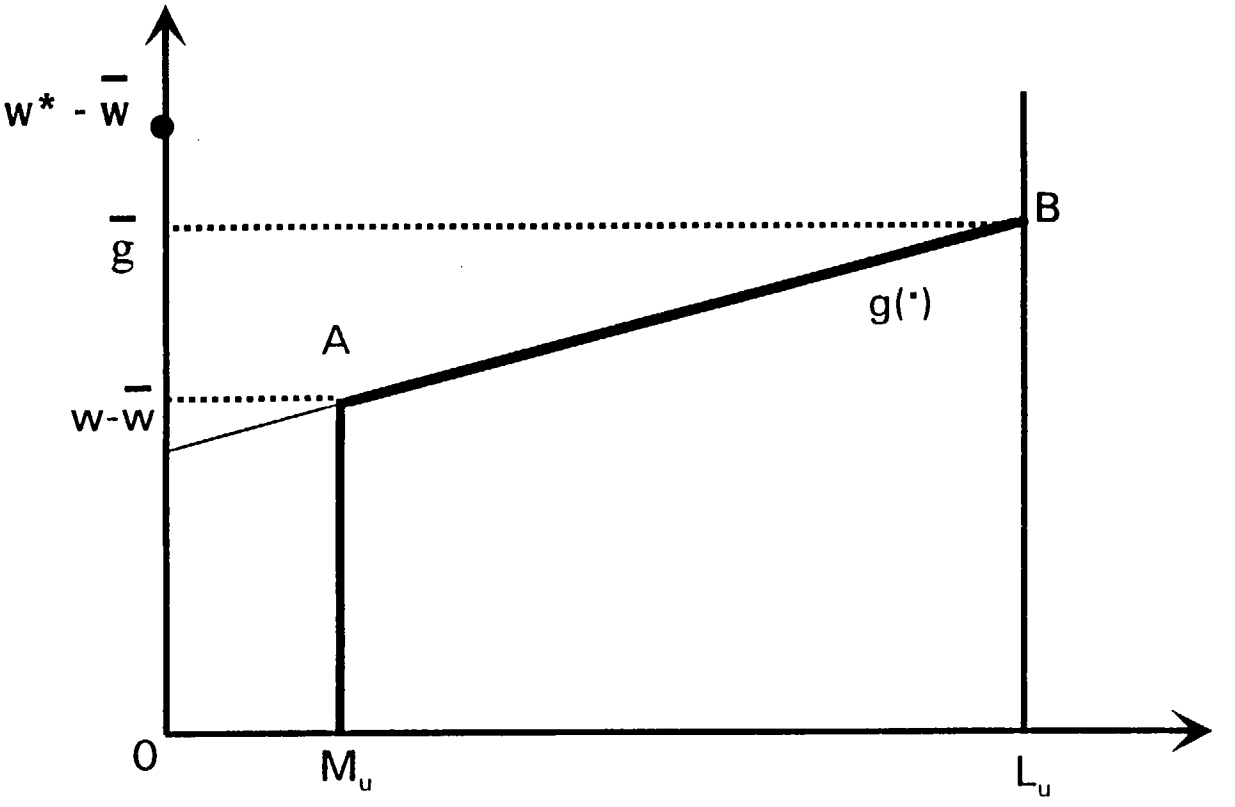

Figure 1.

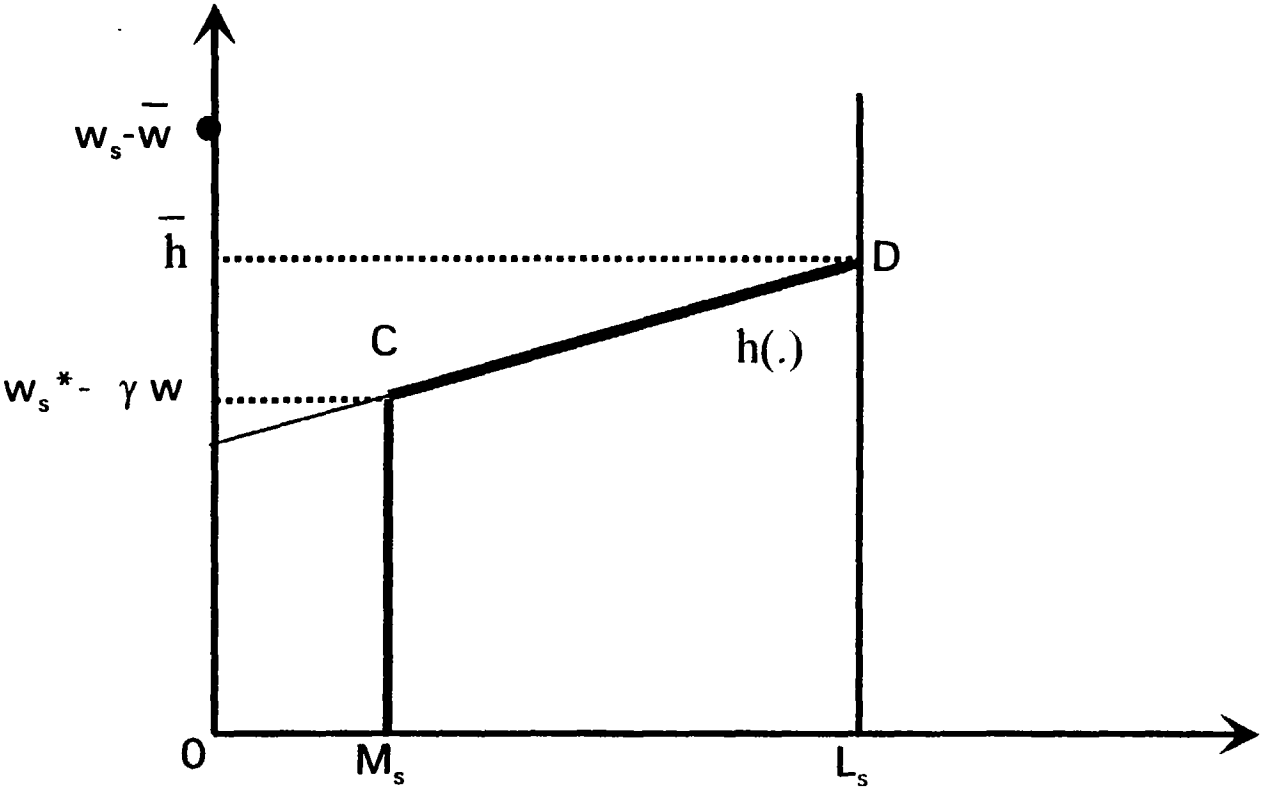

Figure 2.

2 equal to $L_S - M_S$. Note that Figure 2 differs from Figure 1. In Figure 1, the binding constraint on migration is the ability to finance the migration costs. In Figure 2, the binding constraint is the wage differential between the destination and the home country.

There is a strong element of irreversibility in the migration of labor. For instance, assume that in the second period the wage in the destination country is lower than expected at migration time and/or that the wage in the sending country is higher than expected. Hence, in retrospect, some emigrants would have been better off had they not migrated. However, they will not return unless w^* falls sufficiently below w to make it worthwhile to pay for return migration costs. Since wages in the North (or West) are typically higher than in the South (or East), there will be no return migration even if some migrants would have preferred not to have migrated given the new wage configuration. In our model, with protection of the capital-intensive sector in the South and positive return migration costs, migrants do not return.

To close the model we need to include the conditions for factor market equilibrium,

$$(9) \quad \text{(i)} \quad c_1^1(\cdot)y_1 + c_1^2(\cdot)y_2 = L_u - M_u + \gamma(L_s - M_s)$$

$$\text{(ii)} \quad c_2^1(\cdot)y_1 + c_2^2(\cdot)y_2 = \bar{K},$$

where y_i ($i = 1, 2$) are the output levels in each industry and $\bar{K}$ is the total endowment of capital. The labor endowment is expressed in labor efficiency units of those workers remaining in the country (with $M_u = M_s = 0$ during the first period).

Equations (2), (3-i), (3-ii), (7), (8), (9-i) and (9-ii) solve for $\tilde{w}$, $\tilde{w}_s$, r, M_u, M_s, y_1 and y_2. In fact, the system is recursive, with (3-i) and (3-ii) solving for $\tilde{w}$ and r; $\tilde{w}_s$ is next obtained from (2), M_u and M_s are solved from (7) and (8) and finally (9-i) and (9-ii) solve for

y_1 and y_2. Note that the real wages w and w_s are obtained by using $w = \tilde{w}/(1 + \tau)^{\alpha}$ and $w_s = \tilde{w}_s/(1 + \tau)^{\alpha}$.

5. The Effect of Trade Liberalization

In this section, we examine the comparative statics of trade liberalization by the country of the South. We first examine the effect of a change in the tariff level τ within a given country over time with stable population, and then compare two countries with stable population which are identical except for their tariff level τ. In the comparison over time, we assume that the tariff level was permanently fixed in the past, so that the country is in long-run equilibrium, and we examine the effect of a trade reform (i.e., of a change in the tariff level). In the cross-country comparison, we examine the differences between two countries which are at their long-run equilibrium under different tariff levels. The latter is equivalent to a comparison within a given country over time with population growth replacing the emigrants (under the initial trade regime).[10] The two types of simulations are identical if there are no irreversibilities. In the case of migration, irreversibilities are present and the two simulations give different results.

The comparison over time with stable population may apply to countries which are in the post-demographic transition stage, such as Eastern European countries and countries from the former Soviet Union where the rate of population growth is about nil. As mentioned above, the cross-country comparison is qualitatively equivalent to a comparison within a country with population growth and applies to immigration from countries such as Egypt, Morocco and Mexico who experience rapid population growth.

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[10] Changes in the trade regime will affect the level and skill composition of migration. Population growth is assumed to be equal to the initial level (and composition) of migration and not to change with changes in trade policy.

A. Comparison over time

A.1. Skilled (unskilled) labor constrained by incentives (costs).

We first consider the case where unskilled workers' migration is cost-constrained and skilled workers' migration is incentive-constrained. This assumption is supported by Reed's empirical results mentioned earlier. In section A.2, we show the conditions under which this is true. Consider the case of a country in the South in long-run equilibrium with unskilled labor force $L_u - M_u$ and skilled labor force $L_s - M_s$. Assume the country carries out a partial trade liberalization which is represented by a fall in tariff protection τ to the capital-intensive import-substitution sector. This causes $\tilde{w}$ and $\tilde{w}_s$ to increase and causes r to fall. Since the nominal wages $\tilde{w}$ and $\tilde{w}_s$ increase and τ falls, the real wages w and w_s increase proportionately more than the nominal wages. With partial trade liberalization, wages in the domestic economy remain lower than wages abroad. The fact that unskilled wages increase enables a greater number of unskilled workers to finance their migration costs. Thus, migration of unskilled workers takes place and a new equilibrium occurs at a migration level above M_u in Figure 1.

The equilibrium level of skilled migrants, however, is not affected by the reduction in the gap between wages at home and abroad if M_s workers have already migrated (Figure 2). Although fewer workers would have wanted to migrate at the higher real wage w_s, those who already migrated will not return since $\gamma w^* > \gamma w$ and return migration is costly. Hence, trade liberalization causes no skilled migration flow and no change in the stock of skilled workers remaining in the South.

Thus, the effect of partial trade liberalization is three-fold: it raises the total stock of migrants; it lowers the total labor endowment of the economy; and it raises its average skill

level. Trade and labor migration are complements rather than substitutes in this case. The net effect on the domestic production of exportables and import substitutes is ambiguous. Trade liberalization has a positive impact on the production of exportables and a negative impact on the production of importables. On the other hand, the increased migration that trade liberalization induces the opposite (Rybczynsky) effect.

We show at the end of Section A.2 the conditions under which the assumption of an incentive constraint for skilled workers and a cost constraint for unskilled workers holds. These conditions are more likely to hold the higher is the subsistence wage and the higher is γ, the parameter of wage difference between skilled and unskilled labor.

A.2. Unskilled labor constrained by either costs or incentives.

Consider now the case where domestic wages for unskilled workers in the South are closer to those in the North so that the assumption that $w^* - w > \bar{g}$ does not necessarily hold.[11] In this case, migration of unskilled workers may be determined by the capacity to finance migration costs when the wage is low and by the expected wage gain if the domestic wage is higher (as might occur with trade liberalization). Figure 3 shows the migration supply function in this case.[12] Point B is the only point where both conditions are binding, that is where $w^* - w = g = w - \bar{w}$. This occurs when $w = (w^* + \bar{w})/2$. This is also the maximum

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[11] As mentioned earlier, differences in technology or human capital could have been used to generate the wage difference. Then, this case might apply to a middle income country while the case examined in sub-section A.1 would apply to a lower income country, with the wage difference between the two types of countries due to technology or human capital differences. In this model, wage differences are generated by trade policy. Then, the analysis in sub-section A.2 applies to the case of lower trade protection.

[12] Note that now in Figure 3 we are using w rather than $w - \bar{w}$ on the vertical axis.

migration point ($\tilde{M}_u$). Thus for $w > (w^* + \bar{w})/2$ the relevant migration schedule is CB while for $w < (w^* + \bar{w})/2$ the relevant migration schedule is AB.

Note that as the wage rate increases, migration does not rise indefinitely. It reaches its maximum at $\tilde{M}_u$ for the unskilled and $\tilde{M}_s$ for the skilled (see Figure 4). Thus, the model yields a maximum rather than an unbounded migration level. This is an appealing feature since it is consistent with the observation that countries do not empty themselves of their entire population. The maximum outmigration of effective labor is $\tilde{M} = \tilde{M}_u + \gamma\tilde{M}_s$. As is well known, a country may specialize in production if migration is sufficiently large. the analysis is based on the assumption that specialization in production takes place at a level of migration larger than $\tilde{M}$.

In Figure 3, a trade liberalization that raises the domestic wage rate from w_0 to w_1 would increase the stock of migrant workers from M_u^0 to M_u^1 and trade and migration would thus be complements. If the wage increase is larger (because trade liberalization is deeper) and wages increase from w_0 to w_2, migration patterns switch from the AB to the CB schedule. The interesting point is that in this case because initially M_u^0 workers are already out of the country and w^* is higher than w_2, workers will not come back and thus trade liberalization would have no effect. That is, trade liberalization can never lead to return migration and to a decrease in the stock of migrants. It will either raise the number of migrants or will leave it unchanged.

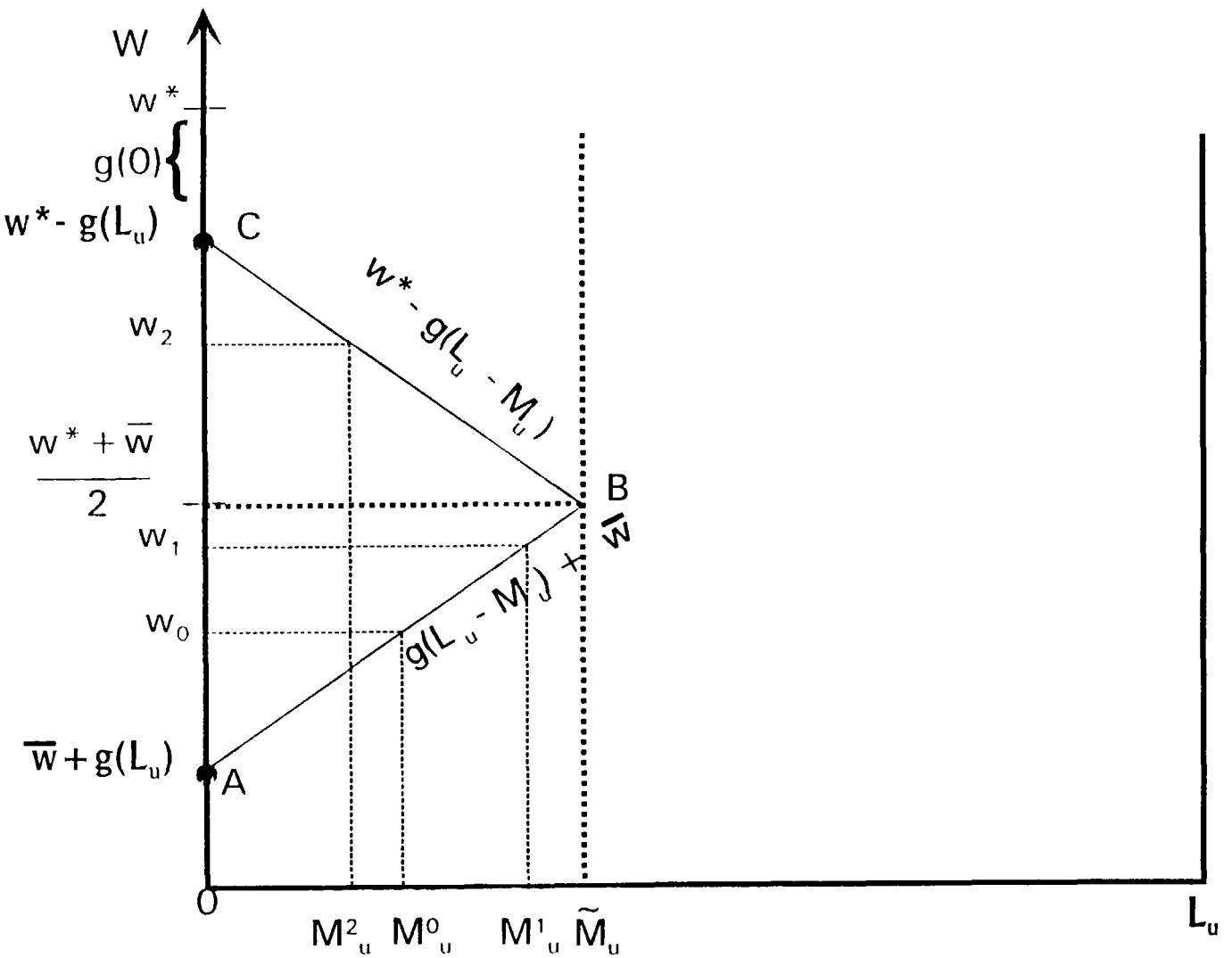
W
w*
g(0)
w* - g(L_u)
C
w* - g(L_u - M_u)
w_2
(w* + w̄)/2
B
w̄
w_1
w_0
g(L_u - M_u) + w̄
w̄ + g(L_u)
A
0
M²_u
M⁰_u
M¹_u
M̃_u
L_u

Figure 3.

Under what conditions is it true that migration of unskilled workers is determined by the financing constraint while migration of skilled workers is determined by the incentive constraint? From the previous analysis, it is clear that this occurs when

(10) (i) $$w < \frac{w^* + \bar{w}}{2}$$, and

(ii) $$w_s > \frac{w_s^* + \bar{w}}{2}$$,

where $w_s^* = \gamma w^*$. Equations (10-i) and (10-ii) are simultaneously satisfied if

(11) $$\frac{ws^* + \bar{w}}{2\gamma} < w < \frac{w^* + \bar{w}}{2}.$$

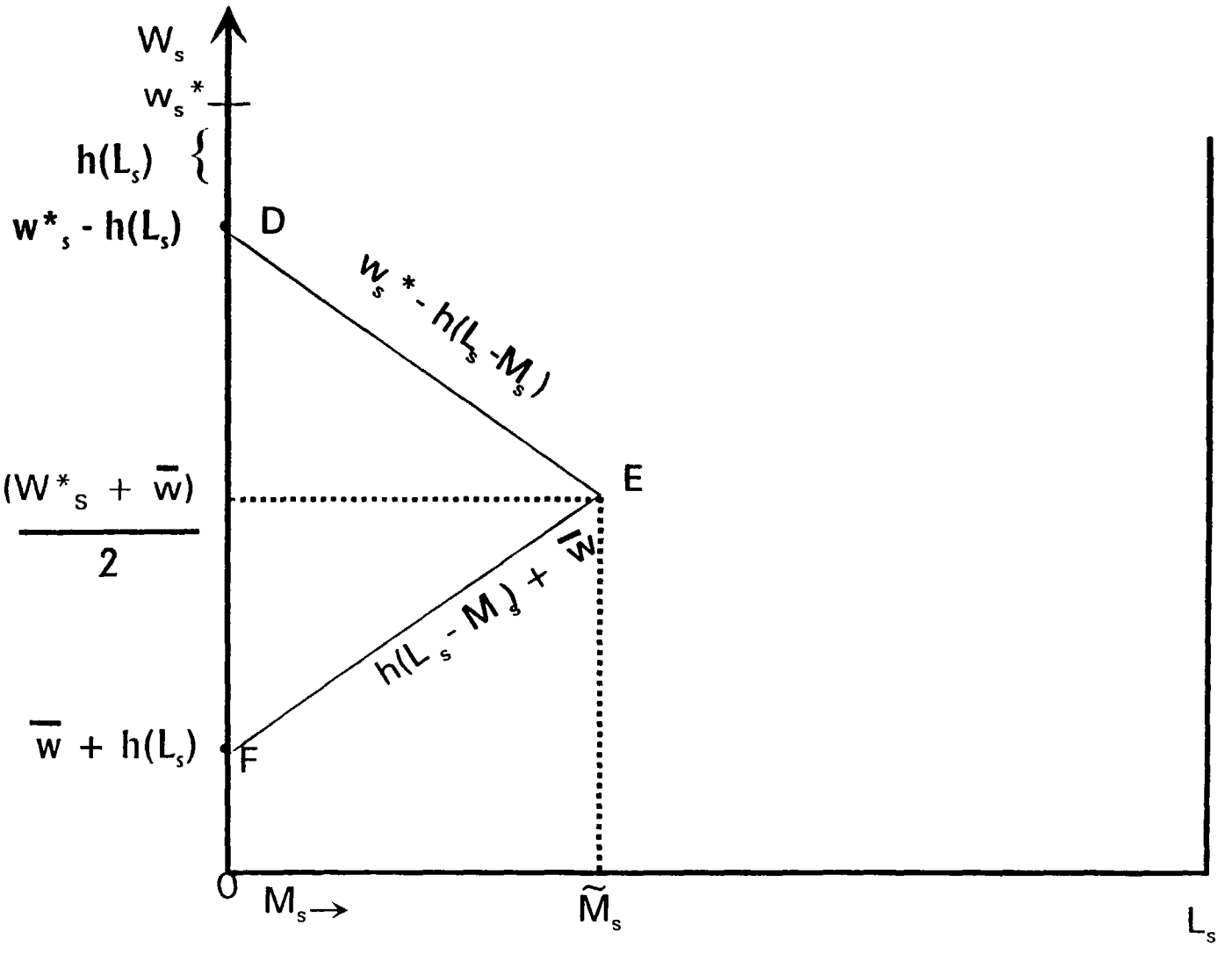
W_s
w_s^*
$h(L_s)$
$w^*_s - h(L_s)$
D
$w_s^* - h(L_s - M_s)$
$(W^*_s + \bar{w})$
2
E
$h(L_s - M_s) + \bar{w}$
$\bar{w} + h(L_s)$
F
0
$M_s \rightarrow$
$\tilde{M}_s$
L_s

Figure 4.

If w is outside the range set by equation (11), both skilled and unskilled workers are either cost-of-migration-constrained (if $w < \frac{w_s^* + \bar{w}}{2\gamma}$) or both are incentive-constrained (if $w > \frac{w^* + \bar{w}}{2}$). Anything that increases $(\frac{w^* + \bar{w}}{2}) - (\frac{w_s^* + \bar{w}}{2\gamma}) =$ $\frac{1}{2}\left[w^* - \frac{w_s^*}{\gamma} + \frac{\gamma - 1}{\gamma}\bar{w}\right]$ raises the range for which inequality (11) holds. Thus, the larger is the subsistence wage and the larger is the wage differential γ between skilled and unskilled labor, the broader is the wage range for which inequality (11) holds, i.e., for which migration of skilled workers is incentive-constrained and migration of unskilled workers is cost-constrained. [13]

To summarize the above, we can state

Proposition 1. The effect of trade liberalization in a country with stable population is as follows: 1) it raises the migration of unskilled workers; 2) migration of skilled workers remains unchanged; 3) the size of the labor force falls; 4) the average skill level rises; but 5) in the case where unskilled labor becomes incentives-constrained after trade liberalization, their migration level may remain unchanged.

The effect of increased protection is as follows: 1) it has no effect on the migration of unskilled workers; 2) it raises the migration of skilled workers; 3) it lowers the average skill level of the population; and 4) it reduces the size of the labor force.

---

[13] We have assumed that the wage differential γ in the South is not necessarily equal to the wage differential in the North γ^*. If $\gamma = \gamma^*$, then $w^* = w_s^*/\gamma$ and the range set by equation (11) simplifies to

$$\frac{\bar{w}}{2}(1 - \frac{1}{\gamma})$$

B. Comparison across countries.

We now turn to a comparative statics exercise which compares two countries in the South which are identical except for their trade regime. This comparison applies also to the effect of a trade reform in a given country whose population growth replaces the pre-reform migrants. The question in this case is: how do the level and composition of the labor force differ in two countries which have identical technologies, equal initial factor endowments, and which face the same world prices but differ in the level of protection conferred to the capital-intensive industry.

Using Figures 3 and 4 can provide some insights in this respect. The high protection country has lower wages than the low protection country. If the unskilled wage rate is below $(w^* + \bar{w})/2$, more unskilled labor will have migrated in the country that has a more liberal trade regime (complementarity between trade liberalization and migration). And if the skilled wage rate is above $(w_S^* + \bar{w})/2$, the more liberal country will have fewer skilled workers who migrated than the more protected country (substitution between trade liberalization and migration). That is, if migration of unskilled workers is cost-constrained and that of skilled workers is incentive-constrained, we obtain that the more open country will have had a larger emigration of unskilled workers and a smaller emigration of skilled workers. Thus, the effect on the total level of migration is ambiguous. Consequently, the labor force may be larger or smaller in the country which follows a more liberal trade policy, but it will unambiguously be more skilled.

Alternatively, assume that population growth within a country is such as to replace the migrants and leave the level and skill composition of the population unchanged given the initial trade policy. Then, trade liberalization will result in a continuous increase in the skill level of

the population. The reason is that fewer skilled and more unskilled workers leave than are being replaced. The effect on the labor force as a whole is ambiguous.

To summarize the above, we can state

Proposition 2. Comparing two countries with stable populations but with different trade policies, and assuming that unskilled workers are cost-constrained in both, the more open country will have: 1) a larger emigration of unskilled workers; 2) a smaller emigration of skilled workers; and 3) a more skilled population.

6. Extensions

The approach developed here can be used to study the effect of other policies and exogenous changes on migration. Three cases are briefly examined here.

First, setting a minimum wage for unskilled labor results in unemployment in the standard Heckscher-Ohlin model (and specialization). Assuming that unskilled labor experiences a constraint on financing migration costs, the higher minimum wage will result in an increase in migration and in a lower level of unemployment. Moreover, employers will substitute towards skilled labor whose wage will increase. This will have no impact on migration of skilled labor if the comparison is within a country with stable population, and will result in lower emigration of skilled labor under the other comparisons. Thus, a minimum wage law will create less unemployment in the presence of migration and financing constraints and will raise the average skill level.

Second, if wages in the South are lower because of a lower level of human capital than in the North, an increase in human capital would not necessarily affect the incentive to migrate (since wages would rise in both countries for those who acquire more human capital), but it

would weaken the financing constraint. This would result in a higher level of emigration of the less skilled labor who were originally affected by the financing constraint. In that case, an investment which raised the level of human capital uniformly across the labor force would raise the average skill level in two ways: first, because of the investment, and second, because more unskilled labor would migrate. [14]

Third, assume a growing economy whose level of wages increase over time and whose population grows as well. Assume that in the early stage of its development, the country consists mainly of unskilled workers whose migration is restricted by financing constraints. Then, the increase in the level of wages will result in an increase in migration. This increase will continue until the financing constraint is no longer binding, i.e., when $w > (w^* + \bar{w})/2$. As wages rise above that level for most workers, the effect of a further increase in wages is a reduction in the level of migration. This reduction continues until the wage differential is equal to the migration cost of the most efficient migrant, at which point migration stops. This migration pattern over time was found by Faini and Venturini (1993) for Greece, Portugal and Turkey.

7. Conclusion

This paper has considered the impact of trade liberalization in a small developing economy on the migration of skilled and unskilled workers to higher-wage countries. The analysis is developed using a modified Heckscher-Ohlin framework that allows for heterogeneity

[14]The above is rigorously true if the utility function is log-linear, so that the incentive to migrate depends on the relative wage differential. If the utility function is closer to a linear function, then an increase in human capital would raise the incentive to migrate. However, as long as marginal utility of income is diminishing, the effect of an increase in human capital on the financing constraint will be larger than the effect on the incentive to migrate.

of skills, international labor mobility, migration costs, and constraints on financing migration costs. Consistent with the stylized facts, developing countries are assumed to protect capital-intensive activities.

We showed that migration of unskilled, financially constrained workers increases while migration of skilled workers is unaffected by trade liberalization in a developing country with stable population. That is, trade and migration of unskilled workers are complements, with trade liberalization resulting in a smaller and more skilled labor force. Comparing two identical countries except for their trade regimes, we found that the country with lower tariffs has a larger emigration of unskilled workers (trade and migration of unskilled workers are complements) and a smaller emigration of skilled workers (trade and migration of skilled workers are substitutes), resulting in a more skilled labor force and in an ambiguous effect on the size of the labor force. The same result holds in the case of a trade reform within a country with population growth replacing the migrants in the pre-reform situation. If capital is also mobile and skilled and unskilled labor are imperfect substitutes in production, then trade and migration are complements at both skill levels as long as the protected industry is more capital- and skill-intensive than the non-protected industry.

In countries where emigration is an important phenomenon, a more liberal trade regime with internationally immobile capital will result in a labor force with a more favorable skill mix. This finding is robust whether the comparison of trade regimes is made across countries or over time. In the case of internationally mobile capital, the effect of trade liberalization lowers the size of the labor force but has an ambiguous effect on the skill mix under plausible assumptions.

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